
जल एवं अपशिष्ट जल के नमूने लेने तथा
परीक्षण (भौतिक एवं रसायन) की
पद्धतियाँ
भाग 62 टैनिन
(दूसरा पुनरीक्षण)

Methods of Sampling and Test
(Physical and Chemical) for Water
and Wastewater
Part 62 Tannins
(Second Revision)

ICS 13.060.50

© BIS 2023



भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

January 2023

Price Group 4

FOREWORD

‘This Indian Standard (Part 62) (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Water Quality Sectional Committee had been approved by the Chemical Division Council’.

Tannins are a group of water soluble polyphenol compounds. Tannins enter the water supply through the process of vegetable matter degradation or through the wastes of tanning industry. Tannin is used in internal treatment of boiler waters, where it reduces scale formation by causing the production of a more easily handled sludge. Tannins are more common in surface water supplies and shallow wells. Tannins are produced as water passes through peaty soil and decaying vegetation. It causes the water to have a yellow or light brown colour and can provide a bitter taste.

The treatment of wastewaters containing tannins, including settling and biodegradation, is usually difficult because tannins are highly soluble in water, they impart dark color to the water and inhibit the growth of microorganisms in activated sludge. Therefore, their determination in water and waste water is important.

The Technical Committee responsible for the formulation of IS 3025: 1964 ‘Methods of sampling and test (physical and chemical) for water used in industry’ had decided to revise the standard and publish it in separate parts. This standard is one of the different parts under IS 3025 series of standards and supersede Clause 55 of IS 3025. The first revision was published in 2006.

In the second revision the following modification have been incorporated:

- a) Colorimetric method has been deleted.

In the preparation of this standard, considerable assistance has been derived from the method no. 5550 B of — Standard Methods for the Examination of Water and Wastewater, published by the American Public Health Association, Washington, USA, 23rd Edition, 2017.

The composition of the committee responsible for the formulation of this standard is listed in Annex A.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’.

*Indian Standard***METHODS OF SAMPLING AND TEST (PHYSICAL AND CHEMICAL) FOR WATER AND WASTEWATER****PART 62 TANNINS***(Second Revision)***1 SCOPE**

This standard (Part 62) prescribes the spectrophotometric method for determination of tannins in water and wastewater.

2 REFERENCES

The standards listed below contain provisions which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
IS 7022 (Part 1) : 1973	Glossary of terms relating to water, sewage and industrial effluents: Part 1
IS 7022 (Part 2) : 1979	Glossary of terms relating to water, sewage and industrial effluents: Part 2
IS 17614 (Part 1) : 2021	Water quality — Sampling: Guidance on the design of sampling programmes and sampling techniques
(Part 3) : 2021	Preservation and handling of water samples

3 TERMINOLOGY

For the purpose of this standard, definitions given in IS 7022 (Part 1) and IS 7022 (Part 2) shall apply.

4 SAMPLING AND PRESERVATION

Sampling and sample preservation shall be done as prescribed in IS 17614 (Part 1) and IS 17614 (Part 3).

5 SPECTROPHOTOMETRIC METHOD**5.1 Principle**

Tannins contain aromatic hydroxyl groups that react with Folin-Phenol reagent containing phosphomolybdic and phosphotungstic acid, to form

a blue color which is matched against that produced with a series of standard tannin solutions. This method is generally suitable for the analysis of any organic chemical that will react with Folin-Phenol reagent to form measurable blue colour at the concentration of interest.

5.2 Range and Applicability

This method is suitable for estimation of tannin up to 9 mg/l minimum detection limit of this method is 0.1 mg/l tannic acid.

5.3 Interference

Any substance able to reduce Folin-Phenol reagent will produce a false positive response. Organic chemicals known to interfere include hydroxylated aromatics, proteins, fructose and amines. Inorganic substances known to interfere include iron (II), manganese (II), nitride, cyanide, bisulphite, sulphide, hydrazine and hydroxylamine. Both 2 mg Fe(II)/l and 125 mg Na₂SO₃/l individually produces a colour equivalent to 1 mg tannic acid/l.

5.4 Apparatus**5.4.1 Nessler Tubes**

100 ml capacity.

5.4.2. Spectrophotometer

For use at 700 nm, having a light path of 1 cm.

5.5 Reagents**5.5.1 Folin-Phenol Reagent**

Transfer 100 g sodium tungstate (Na₂WO₄·2H₂O), 25 g sodium molybdate (Na₂MoO₄·2H₂O), together with 700 ml distilled water to a 2 000 ml flat bottom boiling flask. Add 50 ml 85 percent phosphoric acid (H₃PO₄) and 100 ml concentrated hydrochloric acid (HCl). Connect to a reflux condenser and boil gently for 10 h. Add 150 g Li₂SO₄, 50 ml distilled water, and a few drops of liquid bromine. Boil without condenser for 15 min to remove excess bromine. Cool to 25 °C. Dilute to 1 l and filter. Store the

IS 3025 (Part 62) : 2023

solution which should have no greenish tint, in a tightly stoppered bottle to protect against reduction by air borne and organic materials.

NOTE — Commercially prepared Folin-Phenol reagent may be used before the recommended expiration date.

5.5.2 Carbonate Tartarate Reagent

Dissolve 200 g sodium carbonate (Na_2CO_3) and 12 g sodium tartarate ($\text{Na}_2\text{C}_4\text{H}_4\text{O}_6 \cdot 2\text{H}_2\text{O}$) in 750 ml hot distilled water, cool to 20 °C and dilute to 1 l.

5.5.3 Stock Solution

The nature of the substance present in the sample dictates the choice of chemical used to prepare the standard, because each substance produces different colour intensity.

Weigh 1.000 g tannin or tannic acid. Dissolve in distilled water and dilute to 1 000 ml.

NOTES

1 Tannin is not individual chemical species of known molecular weight and structure. Their chemical properties depend on source and method of isolation. If a particular substance is being added to the water use it to prepare the stock solution. (1 ml of this stock solution = 1 mg active ingredient).

2 If the identity of the compound in the water sample is not known, use phenol and report results as substance reducing Folin-Phenol reagent in mg phenol/l.

5.5.4 Standard Solution

Dilute the stock solution with distilled water to a desired range. Prepare a minimum of three standards bracketing expected sample concentration.

5.6 Procedure

Bring 50 ml portions of clear sample and standard solution to a temperature above 20 °C and maintain within ± 2 °C range. Add in rapid succession 1 ml Folin-Phenol reagent and 10 ml carbonate-tartrate reagent. Allow 30 min for colour development. Make photometric reading against a reagent blank prepared at the same time at the wave length of 700 nm.

5.7 Calculation

Plot the calibration curve concentration versus absorbance at 700 nm and find the slope of the best fit line. Using the slope find the concentration of tannin in the sample, in mg/l.

ANNEX A
(Foreword)

COMMITTEE COMPOSITION
Water Quality Sectional Committee, CHD 36

<i>Organization(s)</i>	<i>Representative(s)</i>
Chief Scientist, EPTRI, Hyderabad	SHRI N. RAVEENDHAR (Chairperson)
Andhra Pradesh Pollution Control Board, Vijaywada	SHRIMATI M. SREERANJANI SHRIMATI A. SRI SAMYUKTHA (<i>Alternate</i>)
Bhabha Atomic Research Centre, Mumbai	DR S. K. SAHU SHRI I. V. SARADHI (<i>Alternate</i>)
Central Institute of Mining and Fuel Research, Dhanbad	DR BABLY PRASAD DR ABHAY KUMAR SINGH (<i>Alternate</i>)
Central Pollution Control Board, New Delhi	DR J. C. BABU
Confederation of Indian Industry, New Delhi	DR KAPIL K NARULA DR SIPIKA CHAUHAN (<i>Alternate</i>)
Delhi Jal Board, New Delhi	SHRI ASHUTOSH KAUSHIK SHRI SANJEEV KUMAR (YP) (<i>Alternate</i>)
Department of Civil Engineering, IIT Madras	DR LIGY PHILIP DR S. MATHAVA KUMAR (<i>Alternate</i>)
Envirocare Laboratories Private Limited, Thane	DR PRITI AMRITKAR SHRI NILESH AMRITKAR (<i>Alternate</i>)
Drinking Water and Carbonated Beverages Sectional Committee, FAD 14, BIS	MEMBER SECRETARY
Gujarat Pollution Control Board, Gandhinagar	DR D. N. VANSADIA SHRI K. B. VAGHELA (<i>Alternate</i>)
Haryana State Pollution Control Board	SHRI JATINDER PAL SINGH
Himachal Pradesh State Pollution Control Board, Govt of Himachal Pradesh, Himachal Pradesh	DR T. B. SINGH ER PRAVEEN GUPTA
Indian Agricultural Research Institute – Water Technology Centre, New Delhi	DR KHAJANCHI LAL DR RAVINDER KAUR (<i>Alternate</i>)
Indian Chemical Council, Mumbai	SHRI J. I. SEVAK DR MRITUNJAY CHAUBEY (<i>Alternate I</i>) DR N. D. GANGAL (<i>Alternate II</i>)
Indian Institute Of Chemical Technology, Hyderabad	DR SUNDERGOPAL SRIDHAR DR NIVEDITA SAHU (<i>Alternate</i>)
Indian Institute of Toxicology Research, Lucknow	DR S. C. BARMAN DR SATYAKAM PATNAIK (<i>Alternate</i>)
Indian Water Works Association	SHRI VIJAY CHARHATE
Karnataka State Pollution Control Board, Bengaluru	DR H. RUPADEVI DR GOURI GOLSANGI (<i>Alternate</i>)
Maharashtra State Pollution Control Board, Mumbai	DR V. R. THAKUR SHRI S. C. KOLLUR (<i>Alternate</i>)
Ministry of Jal Shakti Department of Drinking Water and Sanitation	SHRI D. A. RAJASEKHAR SHRI SUMIT PRIYADARSHI (<i>Alternate</i>)
National Environmental Engineering Research Institute, Nagpur	DR NOOR A. KHAN

IS 3025 (Part 62) : 2023

National Institute of Oceanography, Vishakhapatnam	DR V. V. S. S. SARMA DR DURBAR RAY (<i>Alternate</i>)
NTPC Limited, New Delhi	SHRI V. RAVI BABU SHRI SUDHIR DAHIYA (<i>Alternate</i>)
Shriram Institute for Industrial Research, New Delhi	DR VIVEK NARAYAN SINGH DR JAGDISH KUMAR (<i>Alternate</i>)
Telangana State Pollution Control Board	DR M.S. SATYANARAYANA RAO
Uttar Pradesh Pollution Control Board	DR ARUNIMA BAJPAI
In personal capacity (1221, Mahatma Gandhi Road, P. O. - Haridevpur, Kolkata, 700082)	SHRI SANJIB KUMAR GOSWAMI
In Personal Capacity (S-168 A- Uppal Sothend, Sector 49, Sohna Road , Gurugram, 122018)	SHRI RAKESH MALHOTRA
In Personal Capacity, (H. No. 1-78/2/12/1, Sathi Reddy nagar colony, Boduppal, Hyderabad, 500092)	SHRI N. MURALI MOHAN
BIS Directorate General	SHRI AJAY KUMAR LAL, SCIENTIST 'F'/SENIOR DIRECTOR AND HEAD (CHEMICAL DEPARTMENT) [REPRESENTING DIRECTOR GENERAL (<i>Ex-officio</i>)]

Member Secretary
KUMARI SHUBHANJALI UMRAO
SCIENTIST 'B'/ASSISTANT DIRECTOR
(CHEMICAL DEPARTMENT), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 2016* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Head (Publication & Sales), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website- www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.: CHD 36 (19332).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones: 2323 0131, 2323 3375, 2323 9402

Website: www.bis.gov.in

Regional Offices:

	Telephones
Central : 601/A, Konnectus Tower -1, 6 th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	{ 2323 7617
Eastern : 8 th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	{ 2367 0012 2320 9474
Northern : Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	{ 265 9930
Southern : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	{ 2254 1442 2254 1216
Western : Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	{ 2821 8093

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. CHANDIGARH. CHENNAI. COIMBATORE. DEHRADUN. DELHI. FARIDABAD. GHAZIABAD. GUWAHATI. HIMACHAL PRADESH. HUBLI. HYDERABAD. JAIPUR. JAMMU & KASHMIR. JAMSHEDPUR. KOCHI. KOLKATA. LUCKNOW. MADURAI. MUMBAI. NAGPUR. NOIDA. PANIPAT. PATNA. PUNE. RAIPUR. RAJKOT. SURAT. VISAKHAPATNAM.